USER AND MAINTENANCE MANUAL

DIESEL CABINET NET CLEANER

D-Drive K-136-300-SD, D-Drive K-188-300-SD-JD and D-Drive K-240-280-SD-JS

A	14.01.15	Approved (ECO-0000615)	EBL	AT / IS
Rev	**Date**	**Issued**	**Issued by**	**Approved by**

Document no.:	DC10000685	**Document part no.:**	10001269	**Project no.:**	88075-01

For a thorough introduction of Your AKVA product, we ask that all users read this entire manual. If questions occur, contact us!

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1 Safety

Safety for the users of our equipment is top focus when AKVA group ASA develop new products and product manuals.

We therefore strongly recommend that everyone that use the equipment, all that perform any type of repairs, service or other maintenance to the product, and all that work in areas where the product is installed read this entire manual and at least this safety chapter.

This recommendation is based on both personnel safety as well as a desire to keep the products in order and avoid damages risked if the safety instructions are not followed.

1.1 Safety symbols

The following safety symbols are used in this manual:

Information

Show caution, danger of damaging equipment and mild injuries to personnel

Warning, may cause injures to personnel

Dangerous situations may occur, danger of escaping

1.1.1 Other symbols used in this manual

Go to or see page or chapter for further instructions or more information

The high pressure system must not be operated, and no work may be performed on the system before the safety precautions described in this manual have been read and understood

Site manager and farm manager are responsible for instructing all workers who are working on the site where the Net Cleaner is going to be used, are aware of this manual, and that everyone understands its content

Safety information from this chapter must not be construed as a warranty by AKVA group ASA that the high pressure net cleaner will not cause injury or damage even if all safety instructions have been complied with

1.2 Receiving new equipment

Make sure that all parts are delivered according to the service note. If the order is incomplete, or any defects are discovered, contact AKVA immediately. Contact information is found in chapter 2.1 in this manual.

AKVA group ASA offers a 1 year warranty, covering production defects. This warranty is efficient after date of shipment to original customer.

Misuse of the equipment due to neglecting instructions in this and other manuals connected to the equipment may invalidate this warranty.

1.3 Inspection before use

High pressure water represents massive forces, and it is therefore important that critical components are inspected and tested regularly.

Safety valves are installed in all high pressure equipment in order to prevent the pressure inside the system from exceeding maximal pressure endured by the various components.
The safety valve is set to open up for water flow in case the pressure exceeds predetermined level. Out of order valves can cause severe damage to the system, as well as endangering personnel safety and damaging equipment installed nearby. (ref. § 30)

The safety valve is set to the maximal working pressure that the equipment manages to endure. Never change this pressure point to a higher pressure. (ref. § 14)

All hoses used in this construction, must be able to endure the maximal working pressure of the equipment. Make sure that all hoses endure this pressure, by looking at the labelling on the hose outside. All hoses must be inspected for tears and other external damages. If the hose is damaged, it must be replaced or repaired before use.

1.4 General safety

Show great caution when using high pressure equipment. The equipment generates a large amount of forces that may cause severe damage to both personnel and equipment if used incorrectly. Whilst using this high pressure net cleaner, the "Regulations about high pressure cleaning and more" (FOR 1992-02-13 nr 1263: Forskrift om høytrykksspyling m.m.), has to be complied. According to § 4 in these regulations, overstepping them is a legal offence.

1.5 Personnel safety

All personnel must be trained in how to operate the equipment and also be made aware of all of the dangers that may be consequences from improper use. (ref. § 6)

Employer is responsible for composing instructions for their personnel, explaining which of the operations can cause danger towards the user. All personnel must know these instructions, and the employer has the responsibility of making sure that the personnel understands it. (ref. § 7)

Employer is responsible for their employees using appropriate protective equipment whilst cleaning with high pressure, such as eye, hand and body protection. Always use anti slip boots whilst walking around the cage edge. When conditions require, employer must order all workers to use necessary safety equipment. (ref. § 9)

A helping operator is mandatory when the person operating the cleaning equipment has reduced vision of the high pressure cabinet. The person operating the net cleaner frame must be able to communicate, preferably visually, with the person operating the cabinet. (ref. § 22)

Fastening and sealing, of leaks in piping- or hose-fittings, can only be performed when the machinery is turned off and without any internal pressure. (ref. § 13)

Employer is responsible for marking, limiting access to and properly securing the area where a high pressure net cleaner is being used. (ref. § 23)

Reaction forces must be balanced when using manually controlled net cleaners. During the cleaning process, only one diver may stay in the water surrounding the high pressure net cleaner. An assistant employee responsible for controlling the pumping aggregate is necessary, so that the process can be shut down immediately in case of any emergency. (ref. § 26)

Under aged personnel (under 18 years of age) must not operate the net cleaner on their own. (ref. Regulations about work performed by children and youth, § 9)

1.6 Equipment safety

1.6.1 Storage

Do not store the equipment at high temperatures. It is advised that the equipment is rinsed off with a narrow beam of water directed away from people after storage, because of risk of Legionella contamination.

Salt water may damage the equipment if left drying inside the system. The high pressure pump, and internal components surrounding this, such as suction pump, filters, safety valve, hoses or other salt water leading components are especially vulnerable towards salt water. When the salt water dries out, the salt crystals will cause corrosion damages to gaskets and sealings over time, causing high abrasion and reduction of the equipment's functions.

If the equipment is being stored for more than one week, it is recommended that the entire system is flushed with fresh water before being placed in storage. If the equipment is being stored over winter, we recommend that it is stored in a frost free environment. Either way, we recommended that the entire system is flushed through with a water and antifreeze solution, in order to prevent any water remnants left inside the system to freeze and possibly destroy the equipment in case of below zero temperatures. The the antifreeze fluid is also a good lubricant for the system and its internal components.

1.6.2 General treatment of the equipment

All mechanical and electronic equipment used in aqua culture industry must be taken good care of to function over time and according to expectations, and in periods when they are mostly needed. Net cleaners work in demanding environments with high pressures, large amounts of water as well as a very aggressive corrosive salt water environment. Because of this, following the maintenance instructions are highly required.

Materials that normally do not require any particular amount of maintenance are chosen for most of the critical components in our net cleaners. Most of the exterior components, however, would be too expensive if made in corrosion resistant materials. Therefore, rinsing off the equipment with fresh water after every use is highly recommended.

All movable parts, such as hinges, locks, gas regulators, wheels etc. must be lubricated after cleaning and rinsing. If scratches or other damages appear in any of the enameled surfaces, these must be clogged immediately in order to prevent further corrosion.

Before using the equipment, it is essential to always make sure that the equipment stands steadily, and if necessary, is securely attached to the foundation. This is essential in order to prevent the equipment from slipping and damaging surrounding equipment or personnel.

When moving the equipment from one installation to another, disinfection is mandatory to prevent contaminations. Always rinse with fresh water after disinfection, not all metal parts, o-rings, sealings nor other internal components are able to endure chemicals from disinfection.

2 Introduction

This user manual is part of the equipment delivered. Preserve the operator manual as long as Your Diesel Cabinet Net cleaner is being used, and make sure that all changes to any of the equipment are being noted in the back of this manual.

Thank You for choosing AKVA group ASA as supplier for Your high pressure net cleaner. Do not hesitate contacting us if You need more information regarding installation, use or maintenance for Your AKVA products.

With four house brands, AKVA group ASA is a world leading supplier of technical aquaculture equipment. Since 1980 we have developed and produced fish farming equipment, both for cages at sea and for land based hatcheries. AKVA represents an industrial standard, which is presumed to be the turn key of the future. Research, project management, fast deliveries and customer follow-up have been in focus to ensure that we deliver the best possible and most cost efficient equipment, and thus contributing to preserve a sustainable aquaculture and a positive development within the aquaculture industry.

We have a wide variety of products, for example: plastic and steel cages, high pressure net cleaners with frames, boats, feed barges, feeding systems, cameras, sensor systems, under water lighting, software for fish farming and recycling systems.

AKVA practice continuous product development to improve the equipment's safety, functions, manner of operation and working reliability. This manual enables the operator to use and maintain the Diesel Cabinet Net Cleaner in a safe and economically sustainable way.

All of our products are pre-installed, tested and delivered from our own production department or approved collaborators. This means that our customers have total control over available components, grouping collocation, testing and deliveries.

Our production staff consists of productive people with great expertise for producing best possible products. Having our own production site gives our customers excellent service in case something goes wrong, or if assistance by any reason is required. AKVA hold most of the parts for our products in stock, and our service staff is available by telephone or on location to assist if necessary. Safety, both for users and equipment is our main focus when developing new equipment and product manuals.

This entire manual, and especially chapter 1 Safety must be read and understood before commencing any work on the equipment

To ensure that the system is installed properly, and that all necessary adjustments are performed in accordance to existing standards, and for the warranty to be valid, personnel from AKVA group ASA must participate in the startup of the system.

Prior to use, repairs, maintenance or any other operations related to the high pressure cleaning system, the personnel must attend proper training by AKVA group ASA.
All net cleaner users as well as other personnel working on the site must read and understand the contents of this manual, and users must follow all procedures and safety precautions described here. This is necessary in order to ensure safe and reliable operations, long life product and most importantly personnel safety. Site owner and farm manager are responsible for that all personnel and users know the contents of all user manuals.

This manual includes instructions and descriptions of use, maintenance and safety procedures for handling the Diesel Cabinet Net Cleaner. All instructions must be followed.

2.1 Contact information

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supportakvasmart@akvagroup.com

Support Fishtalk
tel. +47 - 73 84 28 20
supportfishtalk@akvagroup.com

2.2 How to use this manual

This manual describes how maintenance of the different parts in the Akvasmart CCS Feed System are being performed in the safest possible way. This entire manual must be read and understood by ALL participants in the installation process PRIOR to use of the net cleaner.

! *It is crucial that all employees are aware of all dangers and other safety factors that may affect the maintenance processes, considering both the installers and the equipment*

Before the first chapter, is a table of contents. The headlines works as links to their respective chapter in the .pdf-file.

Chapter 1 is the most important chapter of the manual. Here are all safety precautions, warnings and other safety information that ensures safe maintenance. This, of course, assumes that all workers have read and understood the manuals contents.

Chapter 2 contains information on how AKVA work, and instructs necessary procedures for before using the equipment. Also, this how-to-information is included in the introduction chapter. Chapter 3 gives an overview over general net cleaners, as well as specifications for the current cleaners. Chapter 4 contains preparation instructions for before each use, in chapter 5 are instructions for starting and stopping the diesel cabinet net cleaners. Chapter 6-9 introduces the emergency stop, the control panel alarms, net cleaning frames and the mobile control unit.

Chapters 10 and 11 provide instructions for cleaning and maintenance, including frequencies, and chapter 12 contains tables and registration forms.

Three appendixes are found in the back of the manual: Index, with links to the rest of the manual in the .pdf-document, a deviation form for all deviations with the system, and pages for notes about new and extra information are also in the back of the manual.

3 Information

3.1 Model description

All of our diesel net cleaners are developed according to these public standards and procedures:

- ISO-EN 12100 Part 1&2: Safety of machinery
- EC-Directive 98/37/EC: Machinery Directive
- EC-Directive 97/23/EC: Pressure Equipment

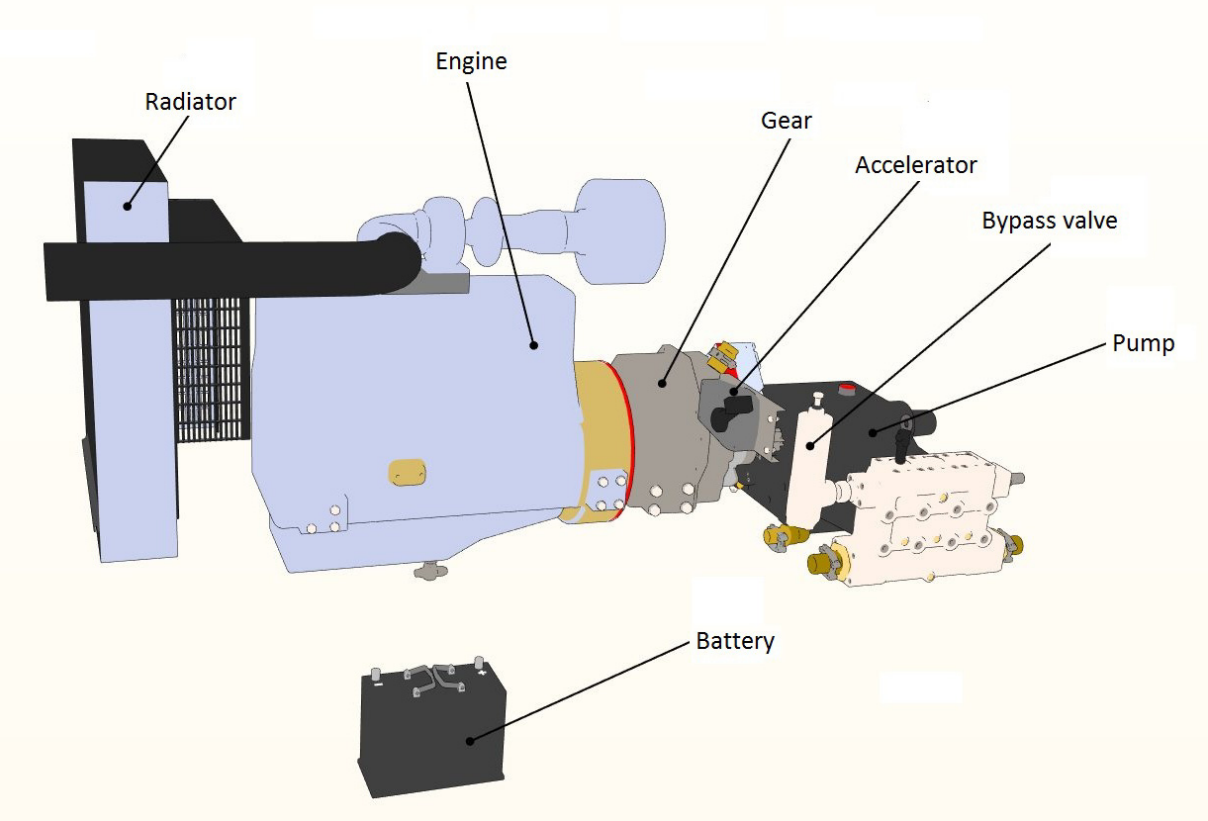
All high pressure net cleaner from AKVA group have a uniform model description. The description contains information about capacity, structure and function. Example:

K - 136 - 300 - S - D - JD
| | | | | | |
1 2 3 4 5 6

K = Cold water
136 = 136 liters of water per minute
300 = Water pressure is 300bar
S = Integrated suction pump
D = Diesel motor
JD = John Deere engine

1) K = Cold water
   V = Hot water
2) Liter water per minute
3) Water pressure (bar)
4) Water supply
   - S = Integrated suction pump
   - X = Without suction pump
5) Engine type
   - H = Hydraulic
   - B = Gasoline
   - E = Electro
   - D = Diesel
6) Motor fabrication
   - CO = Comer
   - VA = Vanguard
   - HO = Honda
   - HZ = Hatz
   - IV = Iveco
   - JD = John Deere
   - SU = Sunfarb
7) Volume/effect
   - B and D - effect in Hp
   - E - effect in kW
   - H - Vol.=ccm/rev

3.2 Main components



The cabinet front:

The cabinet backside:

3.3 Specifications

Net cleaner	Motor	Gear	Pump
K-136-300-SD	JD 6068 TF 258	ZF 301 C	MWN 32
K-188-300-SD	JD 6068 TF 258	ZF 301 C	LKN 40 A 1750rpm
K-240-280-SD	JD 6068 HF 158 inter cooler 188hp	ZF 301 C	LKN 45 1750rpm

3.4 Specifications Net Cleaner Frames

Net cleaner	Frames
K-136-300-SD	Quad, Quint
K-188-300-SD	Quint, Hep
K-240-280-SD	Quint, Hep

4 Before use

Read through this entire manual to make sure that every process is performed correctly, reducing the risk of damaging the equipment or hurting personnel on the site

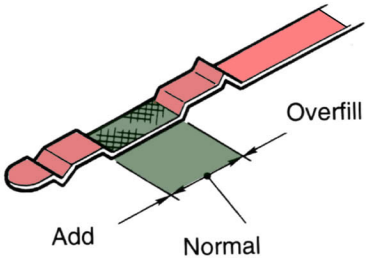
High pressure water represents powerful forces. Therefore, it is important to inspect and test critical components according to maintenance plans

Before every use, check the oil level in the motor, gear and pump according to the instructions in the following pages

4.1 Oil check

Both the motor and the gear box both have dipsticks for checking oil level.

- Read the oil level from the dipsticks
- Add oil if the oil level reaches the "Add" area
- Drain oil if it reaches the "Overfill" area.



Refill motor oil in the front of the motor.

Gear oil is refilled into the same hole as the dipstick sits.

The pump has an oil level window (oil see glass) placed on the side facing the gear, and a refill hole on top.

4.1.1 Motor

Dipstick (back side):

Refill oil (front side):

4.1.2 Gear

Dipstick and refill hole:

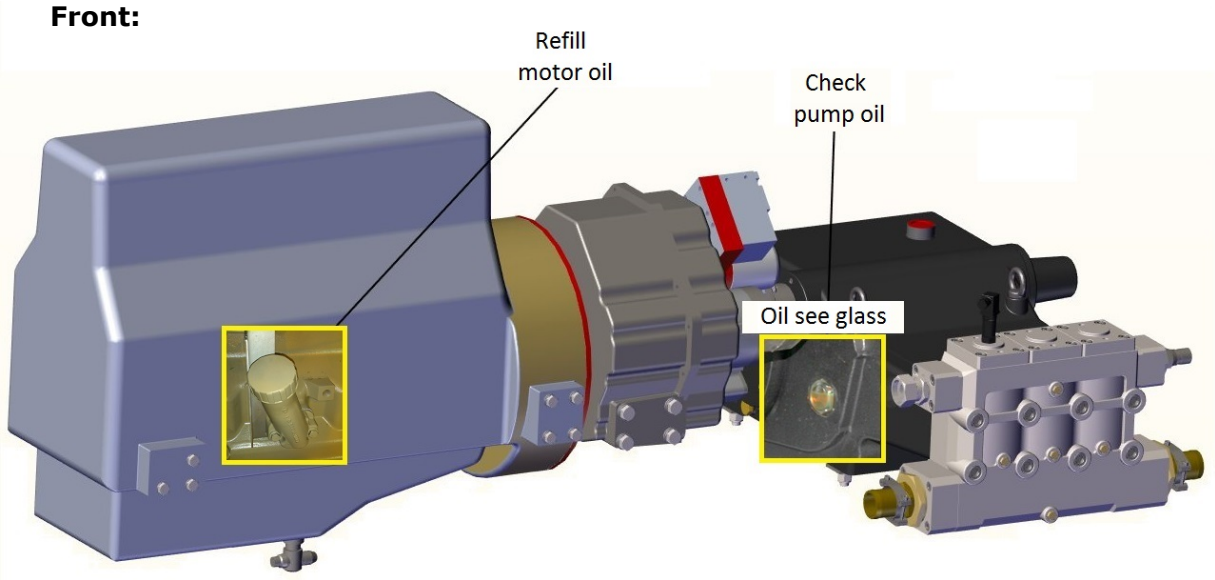
4.1.3 Pump

Oil see glass:

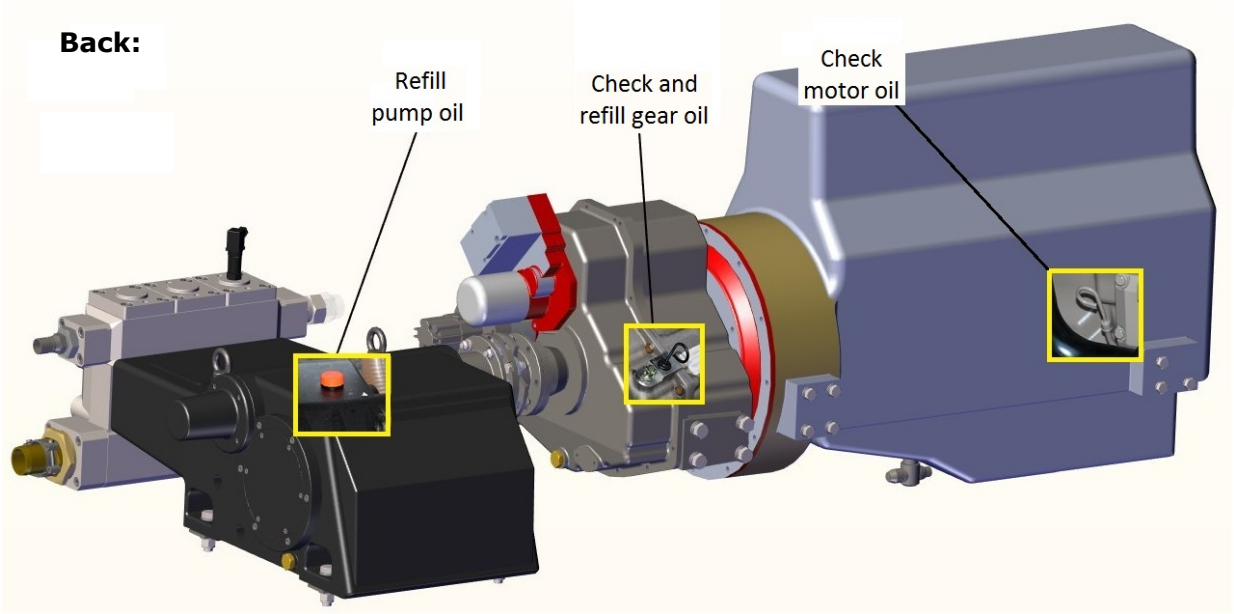
Refill oil:

Overview of checking and refilling oils

Front:



Back:



For further information on motor, gear and pump, see their respective manuals.

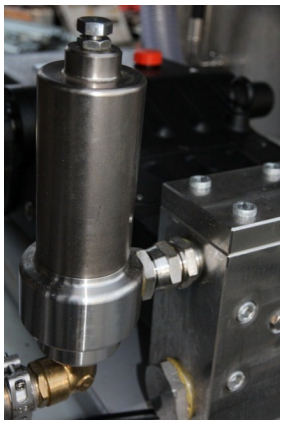
4.2 Coolant

Check the coolant level on top of the radiator.

Open the lid and check the level. Refill in the same opening.

4.3 Safety valve

The predetermined level of pressure in the safety valve must never be changed



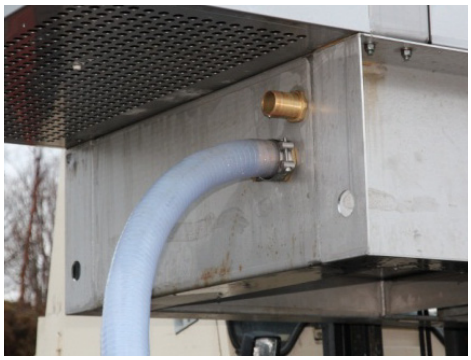
Safety valves are mounted on all high pressure equipment to ensure that the pressure inside the system never exceeds the component's maximum pressure tolerance. The safety valves are set to open for water flow when the water pressure inside the system exceeds the predetermined level. If this does not work as it should, the high pressure will cause serious consequences for both equipment and personnel.

If water appears in the hoses connected to one of the safety valves, something is wrong. Either there is something wrong with the valve itself – in that case, it must be overhauled or changed before use. Another cause for water in the valve hose, is pressure higher than the predetermined pressure. The most common cause of this is net cleaner nozzle condensations. Check these and rinse them. If they are ok, and the pressure still is too high, check the hoses for bends, and flatten these.

4.4 Hoses

All hoses used with this high pressure cleaner must be constructed in order to bear the working pressure of the equipment. Make sure the hose used is able to bear this pressure, by reading the labelling on the outside of the hose. Hoses also need to be inspected in case of tears or other damages. In case of damage, replace or repair the hoses before use.

4.5 Suction hose



Make sure that the suction hose is well attached to the feed pump. It is also important that the entire suction filter is below water during the running of the net cleaner.

4.6 Net Cleaner Frames

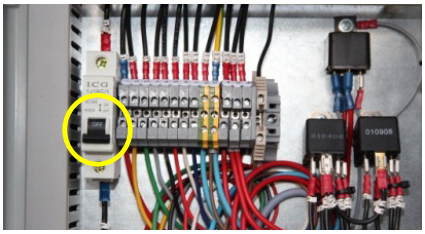
Check the hoses on the frames for bends, these must be flattened. Also check for tears and other destructions. Any damages must be repaired or the hoses replaced before use.

Check the hose couplings, and tighten if necessary.

Run the system with feed pressure to check the conditions of all the nozzles.

5 Starting and stopping the machinery

After going through, and preparing all of the inspection instructions, it is safe to start the system like this:



1 Set the main switch (marked with a yellow ring) to "ON"

2 Press and hold the red button in the control panel

3 Turn the key

4 Press the green start button until the machinery starts (this normally takes about 2 seconds)

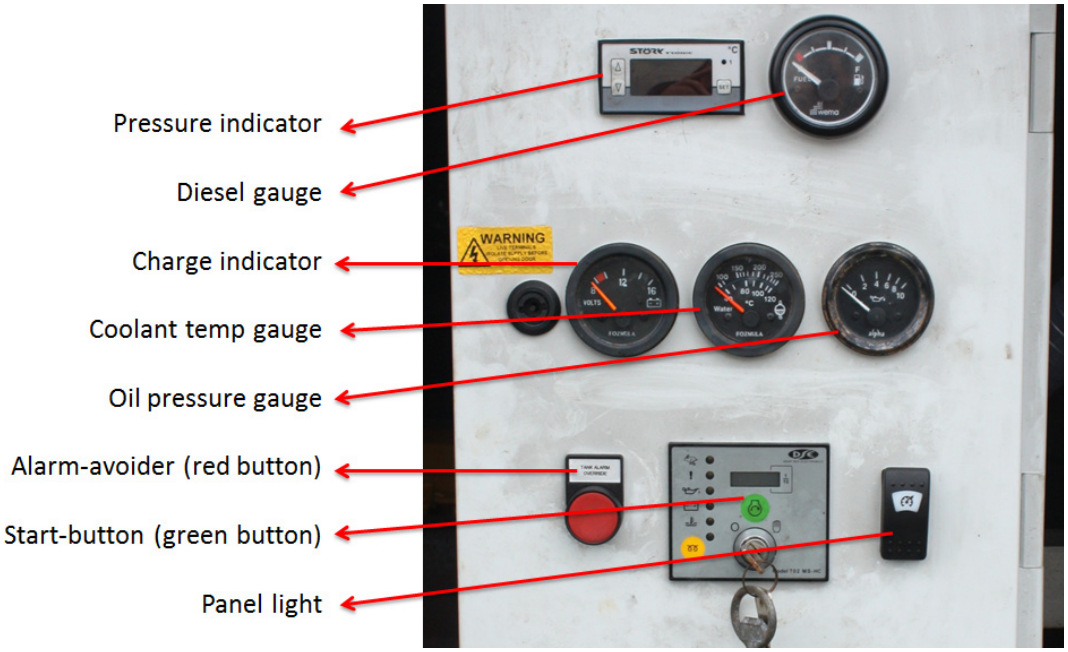
5 Release the red button

6 Open the cabinet door and engage the pump by moving the treadle forwards until it slows down. Leave the treadle in this position for about ten seconds, so that the pump can build up pressure before increasing rpm

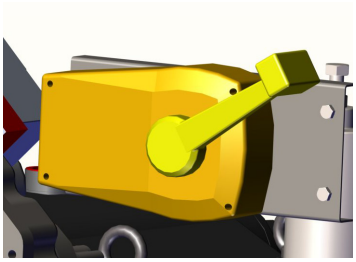
7 After 10 seconds, exceed the power as much as needed

8 To stop, pull the treadle directly back to the starting position, and leave the motor running without load for 3-5 minutes to cool down the system and prevent potential destructions caused by a hard stop (may cause destructions to the turbo and the bearings)

9 Turn the key back to stop the system.

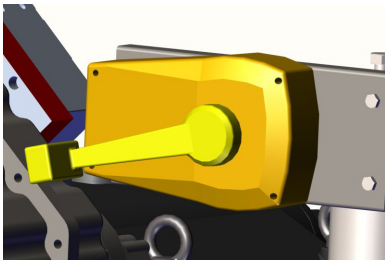


Treadle start up position:



Leave the treadle in this position for about 10 seconds to build pressure:

Push treadle forward to increase motor rpm:



6 Emergency stop and restart

In case of emergency, press the emergency stop button immediately!

Make sure that everything is ok before restarting.

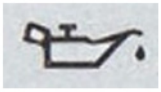
The emergency stop button has to be released before restarting. Turn the button according to the instruction arrow, and the button will be released out to starting position again.

Before resetting after an emergency stop situation, establish the reason for the stop and rectify the fault

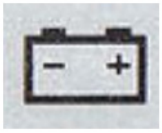
7 Control panel alarms

No function

Feed pressure too low (will activate emergency stop)



Oil pressure is too low (will activate emergency stop)



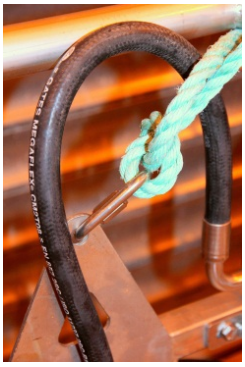
Charge light

High motor temperature (will activate emergency stop)

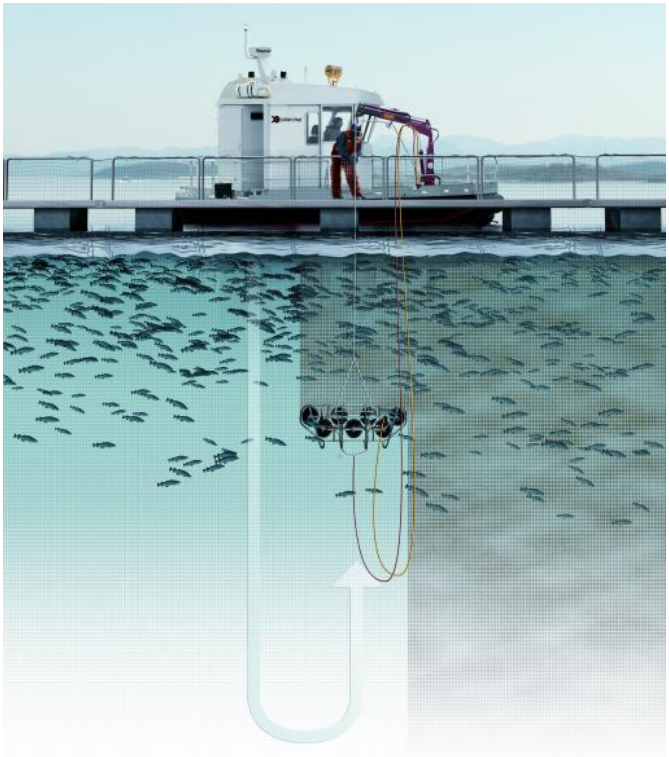
No function

8 Net Cleaner Frame

The rope for lowering and lifting the frame is connected via a safety hooks. This prevents wearing and tearing the rope and prevents it from breaking.



The cleaning process is more efficient when the frame is being pulled upwards. When going down in the water, the operator does not have enough control over the frame to provide a precise cleaning. Whether using crane or manual labor when cleaning the net, let the frame sink to the bottom of the net, and then raise it slowly and controlled to achieve the best possible result.



The net cleaner frame must always be held under water when the machinery is running. For testing the nozzles, however it can be run above water, but only using feeding pressure.

9 The mobile control unit

This unit is an attachment to net cleaners who are delivered with winch

1 - Power switch
2 - Emergency stop button
3 - Roll ropes in or out

This is a simple unit which controls the length of the rope that is connected to the net cleaner frame. A reel for this rope is installed on top of the cabinet. This control unit, allows the user to release as much rope as needed, as well as reeling the rope back in.

This unit can easily be attached to the operator's belt in order to ease the work procedure.

10 Cleaning and storage

10.1 After use/before storage

Regularly service and good maintenance are factors which will prolong the equipment's lifetime and functions.
It is recommended that all of the items in the maintenance plans from chapter 13 are checked according to plan, and also after long lasting cleaning processes. This way, the equipment will always be ready for use, and this will also reduce service costs.

1 Always run fresh water through the system after use

2 Mix 80% water and 20% antifreeze solution and run this through the system to conserve the system, to lubricate the seals and to reduce the danger of frost damages in case of storing in a below 0°C environment. If storing in colder environments, increase the amount of antifreeze solution. Check instructions on the solution bottle

3 If the system can be exposed to frost, it is important that the amount of water inside is as low as possible, but more importantly, there has to be antifreeze solution in the water. The components can burst if a large amounts of water freezes inside

4 Empty the pressure hose and coil it up.

10.2 Inside cabinet cleaning

- Keep the machinery clean, dry and in order
- Clean away any spills of oil immediately
- Do not use high pressure cleaners to clean this equipment, this can cause water intruding into the motor, pump, gear and electronics, and ruining these components
- Use a mild detergent, do not use strong degreasers
- The entire machine is inserted with protection wax in order to reduce corrosion. After cleaning, always apply a new layer of protection wax. If this wax is applied when the machine is still warm, it sticks better, and therefore stays on longer.

Avoid leaving salt water to dry off inside the system, rinse with fresh water after use to prevent corrosion and other damages caused by salt crystals on metals and other materials.
We recommend a rinse with fresh water if the net cleaner is going to be stored for one week or more.

Also, rinsing the outside with fresh water regularly prevents corrosion in the surfaces. All moving parts, such as hinges, wheels, locks, gas regulators must be lubricated after each fresh water rinse. Check all enamel covered surfaces for scratches, and fill these with lubricant to avoid further corrosion. If, before moving, the equipment is disinfected, it has to be rinsed off with fresh water, and lubricant/wax added as mentioned above.

10.3 Cleaning the Net Cleaner Frame

Do not disconnect the net cleaner frame before the system is flushed with fresh water, these parts also needs rinsing.

Remove filth and sprout from the discs, both in front, and especially between discs and the hubs.

Clean between the discs and the plastic cover in the back side.

Clean nozzles and ejectors intakes.

If the net cleaner is not maintained and cleaned properly, this is what you may end up with after some time:

11 Maintenance instructions

11.1 Overview oil

- Oil for motor: 10W-40
- Amount of oil in motor: 20L

- Oil for pump: SAE 220
- Amount of oil in pump: 7L

- Oil for gear: SAE 30
- Amount of oil in gear: 9L (K-136-300-SD) or 14L (other)

Use dipsticks to make sure that the oil amounts are correct.

11.2 Motor

External cleaning: once a week
Oil check: every day
Oil change: First time after 25h use, thereafter every 250h
Change oil filter: First time after 25h use, thereafter every 250h
Air filter: change oil after 250h, check oil every day

11.3 Motor filters

11.3.1 Diesel filter

Open the filter cup, check filter for impurities and change if it is clogged.

11.3.2 Oil filter

Use filter forceps to remove the motor oil filter. Place the forceps around the filter cup, turn to the left and release the filter. Take out the old one, clean the holder with a clean cloth, and put in the new filter. Replace the filter cup and fasten it using hand power.

11.3.3 Air filter

This filter has its own indicator placed on top of the motor, when it turns red, it needs to be replaced.

Procedure:

1 Release the cover by loosening the clamps
2 Take the filter out
3 Check for filth and replace filter if clogged.

11.4 Coolant

The coolant must be changed every other year.

1 Drain the coolant by opening the draining valve placed in the bottom of the radiator

2 Refill with fresh coolant

3 Check the coolant level after refill. If the level is too low, more coolant must be added.

11.5 Ventilating the diesel system

When air appears in the diesel system, it needs to be ventilated out of the system.

Air can appear in the system after:

- running out of diesel
- changing diesel filter
- any work is done with the system.

The ventilation handle is placed on the right side of the diesel filter. When ventilating, push the handle upwards several times, until a smooth resistance is felt.

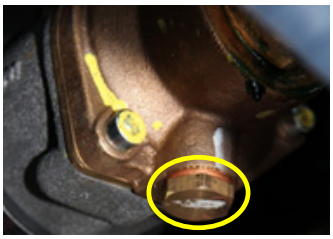
11.6 The pump

Cleaning: once a week
Oil check: every day
Oil change: first time after 50h use, thereafter every 500h
Inspection, function test: when required
Vents: when required
Pressure gaskets: when required
Pistons: when required

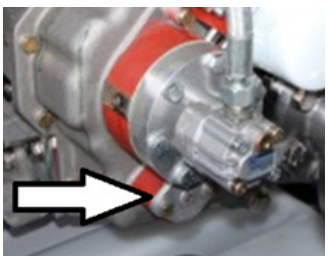
11.7 Gear

Cleaning: once a week
Oil level: once a day
Oil change and sieve cleaning: first time after 50h use, thereafter every 500h use or once a year
Oil cooler, cleaning and if necessary, change of zink anode: every six months

The oil cooler is inspected by removing the end lid. Take the insides out for cleaning. Stake the insides, clean and blow away any contaminations. Replace the insides, and put the lid back on place.

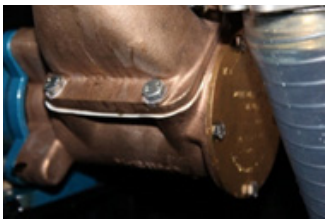


The zink anode is placed inside the nut marked with a yellow ring. This needs to be replaced every sixth month. Release the nut and remove the anode, place a new one in and screw the nut back in its place.



When the gear oil is changed, the coarse strainer, must also be changed. Release the plug, remove the filter and clean the it. The two screws must be fastened with 18 Nm torque.

11.8 Feed pump



Impeller inspection: when required, but at least once a year

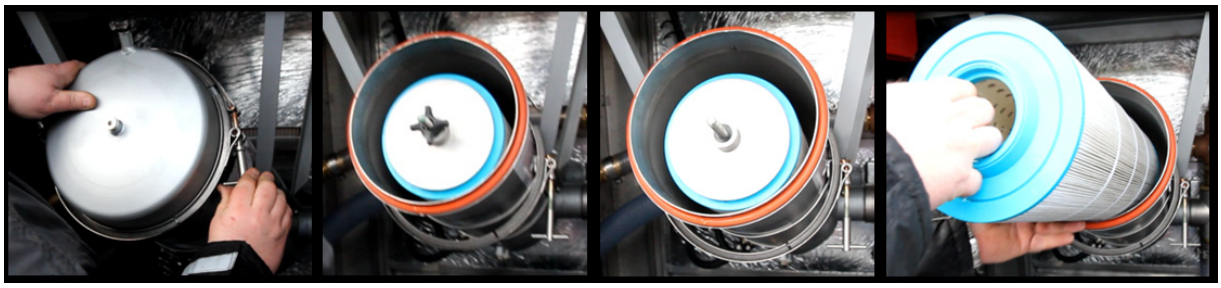
Impeller change: when required

Change ball bearings and gaskets: when required

Remove cover and look inside to control the impeller visually.

11.9 Sea water filter

Since this net cleaner has a dual-pump, it also has two sea water filters. These are attached above the pump in the cabinet.
The filter must be checked every 100h.
Unscrew the glass cylinders and take the filter out of its container for inspection. Clean or replace the filters when required.



11.10 Net cleaner frame

Change ball-bearing when required. Spin the discs manually one by one and listen for rumbling sounds. When the bearings are ok, no sounds will be heard.
Run the system with feed pressure to check the condition of the nozzles on the net cleaner. Make sure to check each one of the nozzles, and clean them if necessary.
Hoses and hose couplings must be checked every six months.

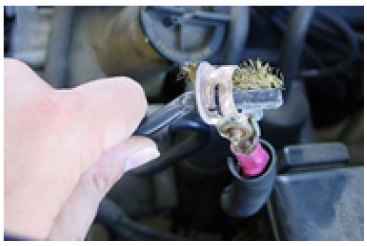
11.11 Battery

Battery level and poles checked every six months. When the poles become dirty, this may lead to quick discharging of the battery because of power leakages. Clean battery poles are therefore important for optimized charge.

Before the cleaning, remove the poles from the battery.

Use protection gloves and goggles to avoid being hurt by the very corrosive battery acid.

Use a steel brush to clean the poles. Brush and clean the poles until they are shiny and clean. Blow off any scrapings.
The negative pole may be harder to reach, so use a a screw driver or something similar to scrape off filth and rust. Blow at the poles to remove loose bits and to see that they are clean.



12 Maintenance plans and registration

Motor:

Task	Service interval					
	Hours	Day	Week	Monts	Year	Comments
Cleaning			1			
Check motor oil		1				
Change motor oil	500					First time after 100h
Change oil filter	500					First time after 100h
Change air filter					1	Control the indicator
Change diesel filter	500					
Inspect coolant level		1				
Change coolant					0,5	Every other year

Pump:

Task	Service interval					
	Hours	Day	Week	Monts	Year	Comments
Cleaning			1			
Check oil						
Change oil		1			1	First change after 50h
Function test					1	
Clean salt water filter	100					

Gear:

Task	Service interval					
	Hours	Day	Week	Monts	Year	Comments
Cleaning			1			
Change oil, clean sieve	500					First time after 50h
Check oil		1				
Check oil cooler, change sink anode					1	

Feeding pump:

Task	Service interval					
	Hours	Day	Week	Monts	Year	Comments
Cleaning					1	

Battery (if installed):

Task	Service interval					
	Hours	Day	Week	Monts	Year	Comments
Cleaning				6		

How to use the maintenance forms

Before commencing any work:

- Make copies of all forms before filling anything in, and collect all plans in the location maintenance folder
- Fill in week number in the daily maintenance form
- Fill inn month in the weekly maintenance form.

This is important in order maintain regular and correct maintenance.

When a task is performed, sign the correct box, under correct day or week and in the correct task row.

Maintenance that is performed more seldom than once a week must be registered in the maintenance form in chapter 13.4 Registration for further maintenance.

Mark the last copy with a post-it or something similar to make sure to never run out of copies!

12.1 Daily maintenance

Make copies of this form before filling anything in

Fill in correct week numbers

Signature in correct box after the task is performed

Week__	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**
Check motor oil							
Check pump oil							
Check air filter							

Week__	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**
Check motor oil							
Check pump oil							
Check air filter							

Week__	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**
Check motor oil							
Check pump oil							
Check air filter							

Week__	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**
Check motor oil							
Check pump oil							
Check air filter							

Week__	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**
Check motor oil							
Check pump oil							
Check air filter							

Week__	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**
Check motor oil							
Check pump oil							
Check air filter							

12.2 Weekly maintenance

Make copies of this form before filling anything in
Fill in correct week numbers
Signature in correct box after the task is performed

Month:	**Week**	**Week**	**Week**	**Week**
Clean the machinery outsides with fresh water				
Clean sea water filter				

Month:	**Week**	**Week**	**Week**	**Week**
Clean the machinery outsides with fresh water				
Clean sea water filter				

Month:	**Week**	**Week**	**Week**	**Week**
Clean the machinery outsides with fresh water				
Clean sea water filter				

Month:	**Week**	**Week**	**Week**	**Week**
Clean the machinery outsides with fresh water				
Clean sea water filter				

Month:	**Week**	**Week**	**Week**	**Week**
Clean the machinery outsides with fresh water				
Clean sea water filter				

Month:	**Week**	**Week**	**Week**	**Week**
Clean the machinery outsides with fresh water				
Clean sea water filter				

12.3 First time maintenance

Parameter	Checked/ changed after	Execution date	Execution by (signature)
Oil change, pump	25h		
Oil change, motor	100h		
Change oil filter	100h		
Change air filter	250h		
Change diesel filter	500h		
Check level/clean battery poles	6 months		
Inspection, impeller	1 year		
Function test, pump	1 year		

12.4 Registration of further maintenance

Date	Parameter description	Operating hours	Next change	Signature

Registration of further maintenance

Make copies of this form before filling anything in

Date	Parameter description	Operating hours	Next change	Signature

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Appendix B - Deviation form

Make copies of this deviation form before filling anything in

Deviation control no.:	

Unit:	**Producer:**	**Prod.no.:**	**Purchase year:**

Deviation description:
Follow up proposition:
Date and signature, declarer:

Follow up directed:
Status:
New action for deviation no.:
Date and signature, follow up:

Appendix C - Notes